

New Analysis and Theory of Deployable Folded Structures, Phase I

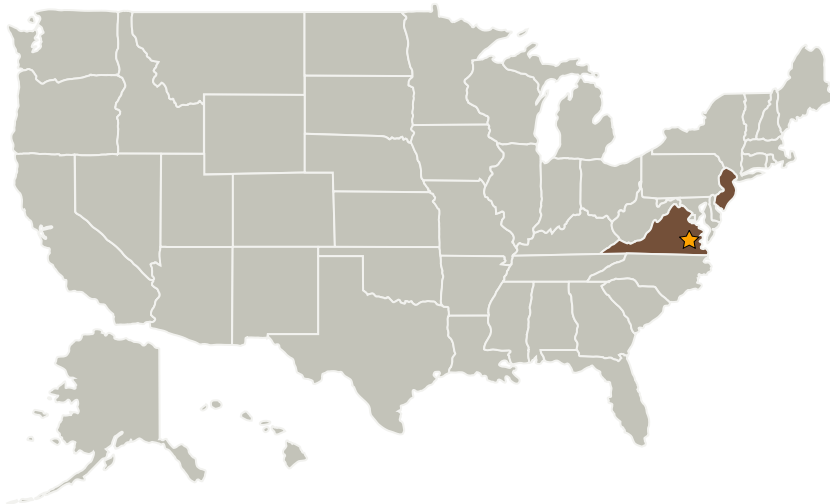
Completed Technology Project (2006 - 2006)



Project Introduction

A recently developed mathematical theory has great value for deployable space structures and in situ manufacture of large beams, panels, cylinders and other components. The new technology offers diverse capacity to design, manufacture, and self-assemble periodically folded sheet material. The range of materials includes many customized core materials for laminated panels, cellular habitat wall constructions, structural beams, parabolic reflectors, and efficient truss systems that can be packaged ideally as a roll of sheet material and deployed in space by inflation or passive radiation. The goal of this proposal is to launch the technology by demonstrating the diversity of folding architectures for deployable and in situ manufacture of space structures, and by developing the design and simulation software for distribution to the engineering community. To fully illustrate the scope of applying the design methodology for deployable space structures, inventories of the strategy for deployment, the desired laminate geometry, and the folding architectures will be made. By relating the dynamical constraints of these three inventories in a three-axis matrix and then optimizing the found solutions through the software, a diverse scope of deployable structures will be illustrated. Moreover, proof of concept for a second generation of software operating through new algorithms will be shown concurrently for space applications and others.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Folded Structures Company, LLC	Supporting Organization	Industry	Ringoes, New Jersey

Primary U.S. Work Locations

New Jersey	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.3 Mechanical Systems
 - └ TX12.3.1 Deployables, Docking, and Interfaces